REMARKS

Applicant, his principal representatives in Germany, and the undersigned have carefully reviewed the Final Office Action of February 2, 2007 in the subject U.S. patent application, together with the prior art cited and relied on by the Examiner in the rejections of the claims. As discussed with the Examiner by telephone on April 30, 2007, the claims pending in the application have been amended a second time in an effort to more clearly patentably define the subject invention over the prior art cited and relied on. As indicated by the Examiner, since the present application is currently the subject of a Final Office Action, it will be necessary to file a Request for Continued Examination (RCE) to provide the Examiner with an opportunity to fully review the currently amended claims. Such a RCE is being submitted currently herewith. Reexamination and reconsideration of the application, and allowance of the claims is respectfully requested.

As disclosed and depicted in the Substitute Specification and the sole sheet of drawings, and as recited in the currently pending claims, the subject invention is directed to a device and to a method for inspecting a printed product including image information. Such a printed product, as set forth in the Substitute Specification may be a security document, such as a stock certificate or possibly currency. It is thus vitally important that the inspection process and device functions effectively and efficiently.

As may be seen in the sole drawing figure, there is provided a single sensor device 02. This single sensor device is provided with at least first and second separate color channels in the single sensor. A CCD camera or a color line camera, as described in the Substitute Specification, is suitable for use as the single sensor which is provided

with at least first and second separate color channels.

Illumination of the printed product is provided by an illumination device that has at least first and second light services. As may be seen in the sole drawing figure, there may be provided three such light services 03, 04 and 06. Each such light source provides an inspection light emission of a select color, with the several colors emitted from the several light sources being different from each other. The light emissions can either reflect off the surface of the printed product to be inspected, or can pass through the printed product. Thus, the light emissions from the several light sources can perform an incident light inspection or a transmitted light inspection. In the configuration depicted in the sole drawing figure the emissions from the light sources 03 and 04 are being reflected at the upper surface of the printed product. The light emission from the third light source 06 is being passed through the printed product.

The single sensor device has a plurality of separate color channels. Each one of these color channels is matched to one of the inspection light emissions from the illumination device. This allows both incident light inspections and transmitted light inspections to be conducted at the same time. The provision of a single sensor device, with a plurality of color channels, again means that different test criteria can be checked using different inspection light emissions of different colors in a single sensor device. The input signals recorded by the sensor device can each be processed separately from each other in accordance with the respective color of the light in the different color channels of the single sensor. While using the single sensor device, the various colors, and the different testing criteria will not be mixed up.

In the Final Office Action of February 2, 2007, claims 14 and 16-29 were rejected

under 35 USC 103(a) as being unpatentable over U.S. patent No. 6,064,477 to Matsumoto in view of U.S. patent No. 6,838,687 to Tullis. Claims 28 and 29 were also recited as being rejected under 35 USC 102(b) as being anticipated by Matsumoto. It is believed that the first rejection under 35 USC 103(a) should be applied against claims 14 and 16-27 and that the rejection under 35 USC 102(b) should be applied to claims 28 and 29. The Office Action will be construed in that context.

Independent claims 14 and 25 were rejected as being unpatentable over Matsumoto in view of Tullis. The Examiner asserted that Matsumoto shows all that is recited in these two claims except for the recitation of the sensor being a single sensor device. It was asserted that Matsumoto "...is silent regarding the device being a single sensor device." Tullis was cited as disclosing the use of "...a single sensor device to detect multiple/different light sources with multiple/different wavelengths...." Element 22 of Tullis, as seen in Fig. 1A, was relied on as providing support for this assertion. It is respectfully submitted that the teachings of the Matsumoto and Tullis references cannot be combined in a manner that would render obvious the present invention, as recited in either of currently amended claims 14 and 25 for the following reasons.

In the patent to Matsumoto, U.S. patent No. 6,064,477 there is disclosed and described a method and an apparatus for use in inspecting a reticle for defects. Initially, it is noted that a reticle is a photomask, not a printed product including image information. It is an object that is provided with a circuit pattern and with a phase shifter formed of a light-transmission film. Since the film used to form the reticle is light-transmissive, the light that is used to inspect it passes through it. The defects which are being sought in the Matsumoto inspection process are minute foreign particles on the

film, and having a size in the submicron range. The reticle inspecting system of Matsumoto has a first illuminating on it on one side of the reticle, a second illuminating unit on the second side of the reticle, a focusing optical system and a signal processing system.

Referring now to Fig. 1 of Matsumoto, there may be seen a reticle 6 which is supported for movement in X, Y and Z axes by three stages 11, 12 and 13, respectively. The reticle 6 is moved very rapidly by successive ones of these stages. A stage drive system 13 is provided with an air micrometer or the like to position the reticle 6 for focusing. This clearly is not a device for inspecting a printed product.

Returning to Fig. 1, a first, front illuminating unit 2, a second front illuminating unit 20, a first back illuminating unit 3 and a second back illuminating unit 30 are provided. The first, illuminating units are provided with laser lights that send light beams of 780 nn in wavelength. The back illuminating units are provided with laser light sources that send light beams of 488 nn in wavelength. The laser light sources are shown at 21, 201, 31 and 301 in Fig. 1. Their respective laser beams are passed through suitable condensor lenses 22, 202, 32 and 302 respectively and are used to illuminate a circuit pattern formed on the first surface of the reticle 6. These laser beam devices are used to uniformly illuminate a linear inspection area of an inspection field 15, which, as seen in Fig. 1 appears to be at the upper surface of the reticle.

A detection optical system is depicted generally at 4 in Fig. 1 of Matsumoto. This detection optical system 4 includes an objection lens 41, a field lens 43 and a wavelength separating mirror 42. The light that is incident on the detection optical system 4 is separated into a scattered light component and a diffracted light component

of the front illuminating units 2 and 20, and of the back illuminating units 3 and 30. The light is separated into these two components by the wavelength separating mirror 42.

As may be seen in Fig. 1, two spatial fillers 44 and 444 are located, in the path of light travel, after the wavelength separating mirror 42. Each one of these fillers 44 and 444 passes its light to a separate detector 51 or 551. These separate detectors 51 and 551 are part of an overall signal processing system, generally at 5. The light passing through the wavelength splitting mirror 42 and through the two filters and lenses 44 and 45; 444 and 445 form images of the inspection field 15 on the recticle 6 on the detectors 51 and 551 of the signal processing system 5.

As discussed at Column 20, starting at line 47 of Matsumoto, each of the detectors 51 or 551 is an imaging device. When a defect, such as a foreign particle, is found in the inspection field 15, while the recticle 6 is scanned by moving the X-stage, the level of the light pattern or the intensity of the incoming light increases. The output of the detectors 51 and 551 also increase.

Turning now to Column 21, starting at line 35 of Matsumoto, it is recited that directly reflected light and directly transmitted light are not gathered. Only scattered light and defracted light are gathered. A foreign particle 70 can be detected because it causes the light that strikes it to be scattered. This allows the foreign object 70 to be discriminated from the circuit pattern 80.

Referring now to the characterization of the Matsumoto reference in the Final Office Action, it is clear that Matsumoto does not provide the characteristics attributed to it. There are two separate sensor device 51 and 551, each of which is a solid-state image detecting device. The four illumination devices 2, 20, 3 and 30 of Matsumoto

produce laser light beams of two different wavelengths. These lights of two different wavelengths are separated by the wavelength separating mirror 42. The two separated wavelength lights are then directed to two separate detections 51 and 551 that are linked to separate binarizing circuits 52 and 552. While the two separate detectors 51 and 551 are recited as being part of a signal processing system 5, it is clear that they are separate detectors.

In the secondary reference to Tullis, U.S. patent No. 6,838,687, there is shown a method and device for identifying recording media in a printer. The purpose of the Tullis device is to determine the type of recording media; i.e. bond paper, plain paper, glossy paper, plastic films and the like which are placed into a printer. Thus, Tullis does not inspect a printed product including image information. Instead, it determines the nature of the media onto which the image information will be placed.

As seen in Fig. 1A of Tullis, a recording media 10 is supported on a media path, which is not specifically shown. Three sources of illumination 12, 14 and 16 are used to illuminate the recording media 10. A photodetector array 22, which is also referred to as an image sensor, is situated above the recording media 10. The photodetector array 22 is an array of optoelectric image sensory devices, such as CCD or CMOS imaging devices. Practical arrays may require as many as 100 by 100 of these image sensing device or elements.

At Column 6, starting at line 27 of Tullis, there is discussed the provision of multiple illuminations of different colors, different angles of incidence or the like. However, the imaging array 22 is still used to differentiate how the light is scattered and reflected by the different media. The use of multiple colors in Tullis is usable to

differentiate different colored media. However, the imaging array 22 is not used to select and to process individual colors from a plurality of the colors that it receives. Its purpose it to provide a high image resolution of the surface of the recording media which is being scanned. It is to be kept in mind that the Tullis device is intended to determine the nature or type of a media before it is to be printed. In other words, Tullis is usable to tell what kind of paper is being put into a printer before the printer is caused to print the paper.

The combination of Matsumoto and Tullis does not render obvious the device for inspecting a printed product including image information, as recited in claim 14, or the method for doing so, as recited in claim 25. As discussed above, in the subject invention there is provided a single sensor device that has at least first and second color channels in that single sensor device. In Matsumoto there is disclosed a signal processing system 5 that has at least two separate device 51 and 551. Each of these separate devices 51 and 551 receives only one wavelength of light due to the imposition of the wavelength separating mirror 42. Instead of providing one sensor device with at least first and second color channels in that separate device, as recited in the currently amended claims 14 and 21, Matusmoto requires at least two separate sensor device 51 and 551. In the subject device, the single sensor can process separate colors in separate color channels. In the Matsumoto device, the colors have to be separated into separate colors by the wavelength separating mirror 42 before each color can be directed to its own detector 51 or 551.

The secondary Tullis reference does not provide the teachings which are missing from the Matsumoto reference. The Tullis device is usable to detect the surface

characteristics of a piece of paper. The Matsumoto device is usable to detect particles in a plastic reticle. In Tullis, there is provided a photoelectric array 22 which is used to provide a one or two dimensional image of the surface of the material being scanned. In other words Tullis detects how smooth or rough the surface is. It may use a plurality of difference colored lights to accomplish that result but that is only because the use of multiple colors helps to differentiate colored media or media that otherwise interacts differently with light of different wavelengths. In this regard, note the discussion at Column 6, lines 50-56 of Tullis.

The combination of Matsumoto and Tullis does not render obvious the claimed device of currently amended claim 14, or the claimed method of currently amended claim 25. Claims 15-24 depend from believed allowable, currently amended claim 14. Claim 20 recites that the sensor device has first, second and third separate color channels. Matsumoto shows two separate sensor devices, each with one color channel. Tullis discloses the use of light sources that could have three different colors but does not teach or suggest anything about the sensor 22 other than that it is a photodetector array. The various dependent claims which depend from believed allowable, currently amended claim 14 are thus also believed to be allowable. There are not claims which depend from independent method claim 25.

Claims 28 and 29 were rejected under 35 USC 102(b) as being anticipated by U.S. patent No. 6,064,477 to Matsumoto. It was asserted that Matsumoto discloses an optical quality scanning system for inspecting printed material. It is again noted that the Matsumoto device is directed to a method and apparatus for inspecting a reticle for defects. A reticle is again defined as a light transmissive film provided with a circuit

pattern and a phase shifter. Defects to be detected are particles which adhere to the reticle and which are to be detected before the reticle is printed onto a wafer. While it is acknowledged that the preamble of a claim is not limiting, it does define the environment in which the claimed device finds use. It is clear that Matsumoto and the subject device are in very diverse fields of endeavor.

Claim 28, as currently amended, positively recites a support for use to orient and position the product for inspection of the image information on the product. In contrast, in the Matsumoto device, the reticle is supported on a stage so that it can be inspected for the detection of foreign particles which may be adhered to it.

In claim 28, as amended, there are recited three separate light sources, each emitting light of a different color. Two of those light sources are claimed as being positioned to emit light onto the printed product's first surface. The third light source is recited as being positioned to emit a third light which passes through a light transmissive region of the support and onto a second surface of the printed product.

In Matsumoto, the front illuminating units 2 and 20 both emit laser light beams with a first wavelength. The back illuminating units 3 and 30 emit laser light beams with a second wavelength. Thus, there are provided only two colors of light in the Matsumoto device. All of these light sources are used to illuminate a circuit pattern that is formed on the front surface of the reticle. The back illuminating units are thus used to also illuminate the front surface of the reticle. There are no inspection lights in Matsumoto whose purpose is to direct light onto a second surface of the printed material.

Claim 28, as currently amended, recites the provision of a single light sensor

adapted to separately sense and evaluate the first, second and third light emissions in the first, second and third colors. The single light sensor is positioned adjacent the printed product's first surface and has first, second and third color channels.

As has been discussed above, the Matsumoto reference uses only two light sources, an upper source and a lower source. These use different wavelengths but both are used to detect foreign particles by sending a scatter pattern to separate ones of two detectors 51 and 551 through a wavelength separating mirror 42. Matsumoto clearly does not show a single light sensor that is provided with three color channels.

Claim 28, as currently amended, further recites that the single light sensor is configured to receive each of the first, second and third light emissions and to generate first, second and third light information signals in response. It is to be noted that the third light emission has been transmitted through the printed product whereas the first and second light emissions are recited as having been reflected from the printed product's first surface.

In the Matsumoto reference, the two separate detectors 51 and 551 each process one of the light wavelength which has been separated into a scattered light component and a diffracted light component. As recited in the Abstract of the Matsumoto reference, the detection optical system is disposed so that it will not gather directly reflected light but instead will gather scattered and diffracted light that has been scattered and diffracted by the reticle. It is thus respectfully submitted that currently amended claim 28 is not anticipate by the Matsumoto reference. Claim 29 depends from believed allowable, currently amended claim 28 and is also believed to be allowable.

The several additional documents listed on the PTO-892 form, which accompanied the Final Office Action, were not relied on in the rejections of the claims. No discussion of those documents is believed to be required.

The Substitute Specification of the subject application was reviewed in the course of the preparation of the subject Second Amendment. Several minor typographical and phrasing errors were noted. These have been corrected in a manner which does not raise any issues of new matter.

SUMMARY

A number of the claims of the subject patent application have been amended a second time to more clearly patentably define the subject invention. A Request for Continued Examination (RCE) is being filed concurrently. Allowance of the claims, and passage of the application to issue is respectfully requested.

Respectfully submitted,

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